

# A0 PHOTOINJECTOR SOLENOID MAGNETS POWER-ON ACCESS PROCEDURE

Prepared by: \_\_\_\_\_ Date \_\_\_\_\_

Approved by: \_\_\_\_\_ Date \_\_\_\_\_

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In order to test and calibrate the A0 Photoinjector (A0PI) Solenoid Magnets (SM), it is necessary to have individuals inside the cave while the Solenoids are powered (i.e., a power-on access) to observe/measure the magnet's performance. Since the three Solenoids are interlocked to the A0PI Safety System, it will be necessary for the ES&H Dept to jumper the safety system interlock for the three Solenoid power supplies so that they will be removed from the interlock chain. In order to accomplish this, an "Interlock Jumper Request Form" must be filled out. A "Power-On Access Hazard Analysis" must also be filled out prior to executing the power on access (this procedure, along with required signatures and any pertinent specifics, will suffice). Approval for the Power-On access must be obtained from the BD/ES&H SSO and RSO (in accordance with BDSP-05-0400).

At all times during the SM power-on access, the two person rule is in effect. The two person rule is required since during the access the door to the cave will be closed and locked. Should an accident occur which incapacitates one of the entrants, the second entrant can exit the cave and summon assistance. Entrants must be approved for this task by the Project Leader or his/her designated alternate. Approved entrants must be familiar with the SM and their hazards. A third person at all times will remain outside the cave as an unexposed observer. The unexposed observer will maintain possession of the A0PI Cave Entrance Key and keep track of entrants.

All personnel who wish to perform a SM Power-On access must read and follow this procedure and they must be approved by BD/ES&H.

**NOTE:** No one with a cardiac pacemaker shall be allowed in the cave while the Solenoid Magnets are on, since even low-level magnet fields (~5G) can affect pacemaker function. The expected magnet fields of the Solenoid magnets at one foot are about 20 Gauss.

**NOTE:** This procedure is only valid when voltage < 15 VDC and amperage < 300 A. If either parameter is higher, the procedure must be stopped, the SM power locked off, and ES&H Dept. consulted.

**NOTE:** The following magnetic field strength exposure limits will be adhered to:

Whole Body Exposure < 600 G (60 mT)  
Extremity Exposure < 6000 G (600 mT)

If exposures above this are encountered, stop testing and contact the SSO before proceeding.

## Procedure Steps:

1. Complete jumper request form and coordinate jumpering of SM interlock with BD/ES&H. Complete Power-On Access Hazard Analysis and coordinate power on access with BD/ES&H.

2. Obtain the A0PI Cave Enter-Reset-Permit Key and the Configuration Control P.S. Lockout Key (both are on the same key ring) from the Main Control Room. The unexposed observer must maintain this key in his/her possession during the access in order to ensure that the cave cannot be interlocked and that only approved entrants can enter the cave during the Power-On access. The unexposed observer must maintain possession of this key in until the access is completed and the jumper is removed.
3. Each approved entrants shall ensure that the two RF modulators and all other interlocked supplies (excluding the SM power supplies) are off and Configuration Controlled. Each approved entrants shall ensure that the Configuration Control Key is placed in a job lock box. Each entrant shall perform LOTO on this job lock box. Each approved entrant shall also perform LOTO on the SM power supplies.
4. Each entrant shall ensure that exposed terminals on the SM are sufficiently covered, or otherwise not easily accessible, so that while taking the measurements personnel and conductive objects cannot inadvertently contact energized conductors.
5. RSO shall Configuration Control the high voltage power supplies for the two RF modulators. This will prevent radiation production in the cave.
6. SSO shall inspect the SM, their power supplies, the Configuration Control lockouts, and the LOTO lockout.
7. ES&H Interlock Technician shall jumper the SM power supplies. After SM power supplies are jumpered, the cave may remain in open access as long as the LOTO locks are maintained on the SM power supplies. Once the LOTO locks are removed, the cave will then be in Power-On access mode and only approved entrants may enter.
8. Approved entrants shall enter the cave and securely close the cave door behind them to prevent unauthorized entrants from entering the cave.
9. Approved entrants shall visually search the cave to ensure that no one other than approved entrants are inside. Escort unapproved personnel out of the cave and ensure that the cave door is again closed and secure.
10. Approved entrants shall exit the cave, securely closing the door behind them so that no one else can enter. Approved entrants shall unlock their LOTO locks on the SM power supplies and begin the powering and adjustment process. IF desired, the unexposed observer can control the SM power supplies while communicating with the approved entrants over the phone. The voltage and amperage of the SM should be maintained as low as possible for the access period. Nominal parameters are 15 VDC and 220 Amps.
11. Approved entrants shall enter the cave and securely close the cave door behind them to prevent unauthorized entrants from entering the cave.
12. Approved entrants shall perform SM measurements, taking necessary precautions to ensure that personnel and equipment do not contact exposed conductors of the energized magnet.
13. If entrants must leave the cave during the Power-On access, they must securely close the cave door when they leave so that no others can access the cave during their absence.

14. When the Power-On access is completed the SM power supplies shall be turn off. Then the approved entrants shall Search & Secure the cave, exit the cave (closing the door behind them), make up the cave interlocks, and then brake interlocks (open the cave door) thus removing all jumpered interlocks.
15. BD/ES&H must then be informed that the Power-On access is over and the SM interlock jumper has been removed. Remove LOTO locks and tags from the job lock box. Configuration Control the SM power supplies with their configuration control locks. At this point the cave can revert to open access. Return the A0PI Cave Enter-Reset-Permit Key to the MCR.
16. The Access Coordinator will contact the RSO for removal of the RSO padlocks.